

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SHOWA ALUM CORP

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(72)Inventor : TOKITA HIDEO

ITO SHINJI

TOKUTAKE TOSHINORI

TAKASAKI KANJI

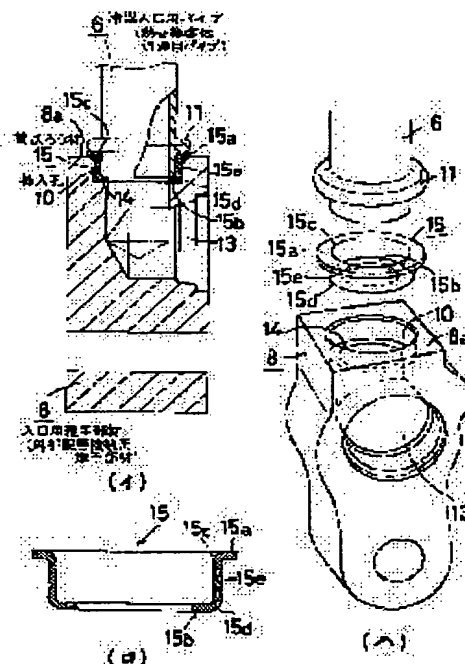
TAKAHASHI KATSUYUKI

## (54) HEAT EXCHANGER

## (57)Abstract:

**PURPOSE:** To surely braze a pipe and a joint member at a low cost by coupling the pipe to the joint member in a tentatively assembled state without neglecting the mounting of a brazing filler metal.

**CONSTITUTION:** The front end of a pipe 6 for a refrigerant inlet is press-fitted and disposed in this state into a pipe insertion hole 10 of the joint member 8 for connecting an outside pipe in the state of interposing a cylindrical brazing filler metal 15 between the outer peripheral surface thereof and this pipe insertion hole 10. In addition, the pipe 6 and the joint member 8 are joined and integrated by brazing via the cylindrical brazing filler metal 15. This cylindrical brazing filler metal 15 is formed by cladding brazing filler metal layers on both the inside and outside surfaces thereof.



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**CLAIMS**

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[Claim(s)]

[Claim 1] It has the pipe for heat exchange medium circulation drawn from the heat exchanger body, and the joint member for external piping connection in which the pipe insertion hole was prepared. The point of the pipe for heat exchange medium circulation in the condition of having made tubed wax material intervening between the peripheral face and a pipe insertion hole inner circle wall The heat exchanger characterized by being arranged in a pipe insertion hole at a press fit condition, and carrying out junction unification and a pipe and a joint member becoming that I will shine through said tubed wax material.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to metal heat exchangers, such as aluminum used as heat exchangers for air conditioners, such as a car air conditioner and a room air conditioner, etc.

[0002]

[Description of the Prior Art] For example, in order that the heat exchanger for air-conditioners might connect this with external piping, generally, the pipe for refrigerant circulation was drawn from the heat exchanger body, and the joint member for external piping connection connected with the point, and it was prepared.

[0003] Conventionally the connection to this pipe for refrigerant circulation, and a joint member As a pipe, for a self fixture, where insertion arrangement is carried out, the point of this pipe to the pipe insertion hole of a joint member at a press fit condition using the welded tube made from an aluminum brazing sheet with which the clad of the wax material layer was carried out outside Using the wax material of the peripheral face of a pipe, it carried out as the junction unification of both was carried out by soldering, and it was carried out.

[0004] However, in having used the clad pipe which carried out the clad of the wax material, such as a welded tube by the brazing sheet, as a pipe for junction to a pipe and a joint member, when such a pipe was expensive, there was a problem of causing the cost rise of a heat exchanger. The problem was large when the die length of a pipe had to be especially lengthened by relation with external piping etc.

[0005] It changes to such connection structure. So, recently As shown in Fig. 10, wax material uses cheap BEAPAIPU made from aluminum extrusion by which a clad is not carried out as a pipe (51), for example. Ring-like wax material (54) is put between the beading section (52) of a pipe (51), and a joint member (53). The point of a pipe (51) is arranged in the press fit condition in the pipe insertion hole (55) of a joint member (53), and the method of soldering in the condition is adopted.

[0006] However, when based on such structure Since the point of a pipe (51) is made with what is pressed fit in the pipe insertion hole (55) of a joint member (53) Even when ring-like wax material (54) had forgotten to be set, it happened rarely to \*\*\*\*\* combining both with a trial fitting condition, therefore not attaching wax material (54), and there was a problem of producing poor junction. Distinction of whether since flux had adhered to the joint of a furnace riser condition especially, soldering by wax material was made was very difficult, and in order that a certain amount of junction condition might be acquired and might keep by the junction force by flux, there was a danger of passing leak inspection of degree process.

[0007] This invention aims at offering the heat exchanger of the structure which can carry out soldering junction of the pipe for heat exchange medium circulation and the joint member for external piping connection which were drawn from the heat exchanger body certainly advantageous moreover in cost in view of the above conventional faults.

[0008]

[Means for Solving the Problem] The pipe for heat exchange medium circulation with which this

invention was drawn from the heat exchanger body, It has the joint member for external piping connection in which the pipe insertion hole was prepared. The point of the pipe for heat exchange medium circulation Let the heat exchanger characterized by being arranged in a pipe insertion hole at a press fit condition, and carrying out junction unification and a pipe and a joint member being in the condition of having made tubed wax material intervening between the peripheral face and a pipe insertion hole inner circle wall that I will shine through said tubed wax material be a summary.

[0009]

[Function] With the above-mentioned configuration, if this tubed wax material is not used when it is the point of the pipe for heat exchange medium circulation in the condition of having made tubed wax material intervening between that peripheral face and pipe insertion hole inner circle wall of a joint member, in the pipe insertion hole with what is arranged in the press fit condition, a pipe and a joint member are not combined with a trial fitting condition. Therefore, in a trial fitting joint activity with a pipe and a joint member, it will surely be equipped, without forgetting tubed wax material, and the danger of \*\*\*\*\* (ing) without wax material is eliminated completely. Therefore, a pipe and a joint member are soldered certainly.

[0010]

[Example] Next, the example which applied this invention to the condenser made from aluminum for car air conditioners called the so-called multi-flow type or a parallel flow type is explained. In addition, it cannot be overemphasized that it is that in which this invention is widely applied to the heat exchanger of various types, such as a heat exchanger of various applications, such as a heat exchanger for room air conditioners and an oil cooler, and the so-called Serpentine type which curved the tube in the shape of meandering, and constituted the heat-exchanger core of heat exchanger, and it deals.

[0011] In the heat exchanger shown in Fig. 9, (1) — is a flat tube, (2) — is a corrugated fin, and these are arranged by turns in the vertical direction at the juxtaposition condition. (3) and (3) are the hollow headers of one pair of right and left, and they are a flat tube (1). — It connects with the free passage condition to both ends. In addition, (4) is a batch member and a refrigerant is a tube (1). — The inside of a header (3) and (3) is in a batch in a predetermined height location so that a group may be circulated in the shape of meandering. (5) and (5) are side plates, and in order to protect the corrugated fin (2) of a vertical maximum outside, and (2), they are arranged on the outside.

[0012] And it is a pipe for refrigerant inlet ports, (7) is a pipe for the said outlets, and (6) is connected to a header (3) and (3) at the free passage condition. The joint member of the flange joint type by which (8) was joined to the point of the pipe for inlet ports (6), and (9) are the joint members of the flare joint type joined to the point of the pipe for outlets (7).

[0013] In each above-mentioned heat-exchanger configuration member, a flat tube (1) is the so-called harmonica tube with which it is based on the extrusion made from aluminum, the interior was divided by two or more \*\* with the bridgewall, and the proof-pressure engine performance was raised. In addition, it is not based on extrusion but a welded tube etc. may be used.

[0014] a corrugated fin (2) — the width of face of a tube (1); and abbreviation — it is what fabricates the web material of the same width of face in the shape of corrugated one, and started the louver, and the aluminum brazing sheet with which the clad of the wax material layer was carried out as this web material is used.

[0015] A header (3) and (3) consist of a header pipe (3a) of the shape of a pipe, and the shape of a cylinder which were made, and a header cap made from aluminum (3b) which plugs up the vertical open end in the outside attachment condition by curving the aluminum brazing sheet of one sheet with which the clad of the wax material layer was carried out to one side or both sides in the edges-on-both-sides section comparison condition. The pipe insertion hole which the tube insertion holes which insert the edge of a tube (1) are installed successively, and inserts the end face section of the pipe for inlet ports (6) and the pipe for outlets (7) in a position is formed in this header (3) and (3). In addition, a welded tube, an extruded pipe, etc. may be used as a header pipe (3a).

[0016] Wax material twists the pipe for refrigerant inlet ports (6) to the extruded pipe made from

aluminum or the drawn tube of raise in basic wages by which a clad is not carried out, and with relation with external piping, the die length is comparatively long, and has the bend section in the end face section. And as shown in Fig. 1, the beading section (11) of the letter of the method protrusion of outside is formed in the point peripheral face of this pipe for inlet ports (6).

[0017] The joint member for refrigerant inlet ports (8) is a flanged-type joint member with the block object made from aluminum of the predetermined configuration which has the flat-surface section (8a) on the top face, and the insertion hole (10) which inserts the point of said pipe for inlet ports (6) is prepared in this top-face flat-surface section (8a). This insertion hole (10) is formed in the bigger path than said pipe for inlet ports (6), and where the point of a pipe (6) is inserted directly, it is extracted easily. In addition, \*\*\*\*\* refrigerant path holes (13) are formed successively relatively [ point / of this insertion hole (10) ], and the step (14) is formed among both.

[0018] In order that attaching may curse with this pipe for inlet ports (6), and the joint member for inlet ports (8), tubed wax material (15) is used. This tubed wax material (15) is based on the clad plate with which the clad of the wax material layer was carried out to both sides, and is manufactured by performing press working of sheet metal to an aluminum brazing sheet for example, etc. This tubed wax material (15) is in the condition that the point of the pipe for inlet ports (6) has been arranged in the insertion hole (10) of a joint member (8), and intervenes between the periphery section of this pipe (6) point, and the inner circle wall of an insertion hole (10). And in the mediation condition, while the pressure welding of the peripheral face of the pipe for inlet ports (6) is carried out to the inner skin of tubed wax material (15), the pressure welding of the peripheral face of tubed wax material (15) is carried out to the inner circle wall of an insertion hole (10), and it is made as [ arrange / the point of a pipe (6) / by it / at a press fit condition / in an insertion hole (10) ].

[0019] It was prepared in the 2nd flange (15b) by which this tubed wax material (15) was projected by the other end at the method of the inside of the direction of a path while the 1st flange (15a) projected to the method of the outside of the direction of a path was prepared in the end section of a body tubed part (15e). And while the 1st flange (15a) is contacted by the top-face flat-surface section (8a) of a joint member (8), the 2nd flange (15b) is designed by the dimension die length contacted by the step (14) at the tip of a way among insertion holes (10).

[0020] Moreover, opening by the side of the 1st flange (15a) of this tubed wax material (15) While being formed in the curved-surface trumpet-like aperture (15c) so that a pipe (6) can be inserted smoothly The periphery edge by the side of the 2nd flange (15b) is also formed in the curved-surface edge (15d) so that insertion to the insertion hole (10) of a joint member (8) can be performed smoothly. In addition, about the pipe for outlets (7), and the joint member for outlets of a flared type (9), you may have the same configuration as an entrance side, adopting a flared type as a detail, although illustration explanation is not given.

[0021] In manufacture of a heat exchanger, each heat exchanger configuration member is first assembled in the trial fitting condition mutually.

[0022] Namely, while inserting in by arranging two or more flat tubes (1) in the juxtaposition condition every predetermined spacing in the thickness direction, inserting a header (3) and (3) in the both ends, and inserting the edge of a tube (1) in a tube insertion hole Insertion arrangement of the corrugated fin (2) is carried out between tubes (1), in addition a batch member (4), a side plate (5), (5), etc. are attached, and it assembles on a heat exchanger body.

[0023] On the other hand, the pipe for inlet ports (6) and a joint member (8) are combined. That is, while inserting the point of the pipe for inlet ports (6) in the interior of tubed wax material (15) from the 1st flange (15a) side, tubed wax material (15) is inserted into the insertion hole (10) of a joint member (8) from the 2nd flange (15b) side. Thereby, the point of the pipe for inlet ports (6) is arranged in the insertion hole (10) of a joint member (8) at a press fit condition, and a joint member (8) and a pipe (6) are combined by the self fixture operation. In addition, a joint member (8) and a pipe (6) are not combined with an integrated state by three persons' dimension relation in the condition of not making tubed wax material (15) intervening. Therefore, in an assembly activity, a joint member (8) and a pipe (6) will be certainly combined with the condition of having made tubed wax material (15) intervening, and incorrect assembly is prevented.

[0024] In addition, while the beading section (11) of a pipe (6) is contacted by the 1st flange (15a) of tubed wax material (15) and the 2nd flange (15b) of tubed wax material (15) is contacted by the step (14) in this condition The 1st flange (15a) of this wax material (15) is contacted by the top-face flat-surface section (7a) of a joint member (8).

[0025] And insertion arrangement of the end face section of the pipe for inlet ports (6) which combined the joint member (8) is carried out at the pipe insertion hole of the header (3) of said heat exchanger body assembly. It is the same as that of abbreviation also about the pipe (7) and joint member (9) of an outlet side. It is assembled by the heat exchanger by the above.

[0026] This heat exchanger assembly is put in all over a furnace the appropriate back, flux soldering or vacuum soldering is performed, and the junction unification of the whole is carried out. The junction unification of the pipe for inlet ports (6) and the joint member (8) is certainly carried out by tubed wax material (15) by this soldering.

[0027] And junction excellent in seal nature is realized from the thing which will follow a pipe (6) and a joint member (8) to a press fit condition by tubed wax material (15), and will shine and which is attached and done.

[0028] In addition, in this example, the beading section (11) of a pipe (8) and the 1st flange (15a) of tubed wax material (15) are made as [ contact / annularly ]. Moreover, it is made as [ contact / the 2nd flange (15b) and insertion hole step (14) of tubed wax material (15) / annularly ]. Furthermore, it is made as [ contact / the 1st flange (15a) of tubed wax material (15) and the top-face flat-surface section (8a) of a joint member (8) / annularly ]. Therefore, the soldering junction of a pipe (6) and the joint member (8) can be changed into a much more positive seal condition. It is manufactured by the above at a heat exchanger.

[0029] In the example shown in Fig. 2, the body cylinder part (15e) of tubed wax material (15) is formed in the shape of taper tubing, and it is made as [ insert / smoothly / the tubed wax material (15) to insertion of the pipe (6) into tubed wax material (15) and the insertion hole (10) of a joint member (8) ].

[0030] It starts and the edge (15f) is formed. moreover, the 1st flange (15a) rose at the periphery edge at the method of outside slanting upper part — It starts with the beading section (11) of a pipe (6). A edge (15f), And it is made as [ form / start and / between a edge (15f) and the top-face flat-surface section (8a) of a joint member (8) / annular wax material \*\*\*\*\* (17) and (18) ], and upgrading of soldering is planned.

[0031] In the example shown in Fig. 3, the tubed body section (15e) of tubed wax material (15) It was cut by two or more slit (19) — in the hoop direction at the point side in which it is formed in the shape of taper tubing, and this tubed body section (15e) contains the 2nd flange (15b) like the thing in the example shown in Fig. 2. By such configuration, the crack of the tubed wax material (15) by inserting a pipe (6) can be especially prevented in taper tubing type tubed wax material.

[0032] the example shown in Fig. 4 — the tubed body section (15e) of tubed wax material (15) — the half-section by the side of the 1st flange (15a) — setting — a center — the section, while being formed in the hard drum-like cylinder part (15g) made thin It was formed at the slack-like cylinder part (15h) to which it connected [ this ] and the half-section by the side of the 2nd flange (15b) made the center section thick. According to this tubed wax material (15), in the perimeter, the pressure welding of the tubed wax material (15) is carried out to a pipe (6) by the hard drum-like cylinder part (15g), and, moreover, the pressure welding of the insertion hole (10) inner circle wall and tubed wax material (15) of a joint member (8) is carried out by the slack-like cylinder part (15h) in the perimeter. therefore, soldering — a pipe (6) and a joint member (8) — seal nature — it is highly joinable.

[0033] In the example shown in Fig. 5, tubed wax material (15) is formed in what omitted the 2nd flange (15b) of a point, and sets in the insertion condition of the tubed wax material (15) to the insertion hole (10) of a joint member (8). It is arranged at the condition that the point of this tubed wax material (15) was estranged from the step (14) of an insertion hole (10). Moreover, in the insertion condition of the pipe (6) to an insertion hole (10), the formation location of the beading section (11) in a pipe (6) is also set up so that the tip of a pipe (6) may be estranged from the step (14) of an insertion hole (10). Even if some dimension errors are in each part

material, while being able to make the beading section (11) of a pipe (6) by this contact certainly the 1st flange (15a) of tubed wax material (15) annularly The 1st flange (15a) of tubed wax material (15) can be made to be able to contact certainly the joint member (8) top-face flat-surface section (8a) annularly, and the high junction condition of seal nature can be acquired.

[0034] In the condition of having changed press fit association of a pipe (6) and the joint member (8) into the condition of having made tubed wax material (15) intervening, in the example shown in Fig. 6 the point of a pipe (6) — the alienation from the step (14) of an insertion hole (10), while being made with what is arranged at a condition It is arranged at the condition that the 2nd flange (15b) of tubed wax material (15) estranged from these between the tip of a pipe (6), and the step (14) of an insertion hole (10). By such configuration as well as the case of the example shown in Fig. 5, even if some dimension errors are in each part material While being able to make the beading section (11) of a pipe (6) contact certainly the 1st flange (15a) of tubed wax material (15) annularly The 1st flange (15a) of tubed wax material (15) can be made to be able to contact certainly the opening periphery section of the insertion hole (10) of a joint member (8) annularly, and the high soldering joint of seal nature can be obtained.

[0035] As for the example shown in Fig. 7, a flared-type joint (8) is adopted as a joint member. And the pipe insertion hole (10) narrows the point, and is formed in the taper hole of \*\*. Moreover, the 1st and 2nd flanges (15a) (15b) are omitted, and tubed wax material (15) is formed in the shape of [ corresponding to an insertion hole (10) ] taper tubing. furthermore, as for a pipe (6), the point corresponds to the inner circumference configuration of tubed wax material (15) — it narrows the point and is formed in the shape of [ of \*\* ] taper tubing. And the point of a pipe (6) is arranged by the press fit condition in the insertion hole (10) of a joint member (8) at the condition of having made tubed wax material (15) intervening. a pipe (6), tubed wax material (15), and the tubed wax material (15) and joint member (8) of each other are certainly combined with a close condition over the large range by such configuration — \*\*\*\*\* — a pipe (6) and a joint member (8) — seal nature — soldering junction is carried out highly. In addition, in the format of this example, as shown in Fig. 8, press working of sheet metal of the tubed wax material (8) was carried out with the flange (15i), and it could be manufactured.

[0036]

[Effect of the Invention] Since this invention is made with that by which the pipe for heat exchange medium circulation and the joint member were soldered using tubed wax material, as a pipe, like before, it does not need to use the clad pipe with which the clad of the wax material was carried out, can use cheap BEAPAIPU, and can perform junction to a pipe and a joint member advantageously in cost by above-mentioned order.

[0037] The point of a pipe in and the condition of having made tubed wax material intervening between the peripheral face and pipe insertion hole inner circle wall of a joint member Since it is made with what is arranged in a pipe insertion hole at a press fit condition, if this tubed wax material is not used, it does not change press fit association of a pipe and the joint member into a trial fitting condition. That sake, Making mistake that an operator forgets anchoring of tubed wax material is prevented, and it can solder a pipe and a joint member certainly.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the perspective view which shows one example of the junction structure of the pipe for refrigerant inlet ports, and the joint member for external piping connection, and drawing of longitudinal section of a joint and drawing (\*\*) change the pipe for inlet ports, a joint member, and tubed wax material drawing of longitudinal section of tubed wax material, and drawing (\*\*) changes drawing (Ha) into a separation condition, and is shown.

[Drawing 2] Other examples are shown, drawing (b) is drawing of longitudinal section of a joint, and drawing (b) is drawing of longitudinal section of tubed wax material.

[Drawing 3] The modification of drawing 2 is shown and it is the perspective view of tubed wax material.

[Drawing 4] Furthermore, other examples are shown, drawing (b) is drawing of longitudinal section of a joint, and drawing (b) is drawing of longitudinal section of tubed wax material.

[Drawing 5] Furthermore, other examples are shown and it is drawing of longitudinal section of a joint.

[Drawing 6] Furthermore, other examples are shown and it is drawing of longitudinal section of a joint.

[Drawing 7] Furthermore, other examples are shown and it is the sectional view in which drawing (b) changes the pipe for inlet ports, a joint member, and tubed wax material into a separation condition, and shows drawing of longitudinal section of a joint, and drawing (b).

[Drawing 8] The modification of drawing 7 is shown and it is drawing of longitudinal section of tubed wax material.

[Drawing 9] The whole heat exchanger configuration is shown, drawing (b) is a front view and drawing (b) is a top view.

[Drawing 10] It is drawing of longitudinal section showing the conventional junction structure of the pipe for inlet ports, and a joint member.

### [Description of Notations]

6 — Pipe for refrigerant inlet ports (pipe for heat exchange medium circulation)

8 — Joint member for inlet ports (joint member for external piping connection)

10 — Insertion hole

15 — Tubed wax material

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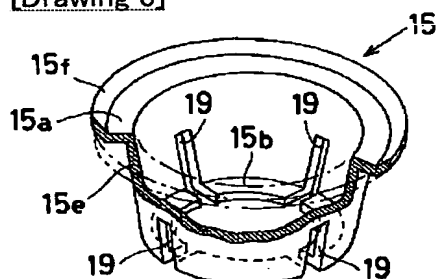
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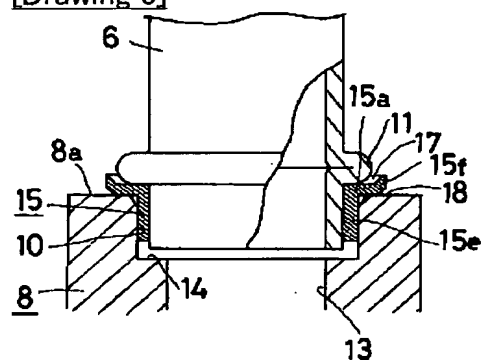
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## DRAWINGS

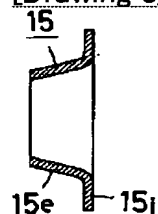
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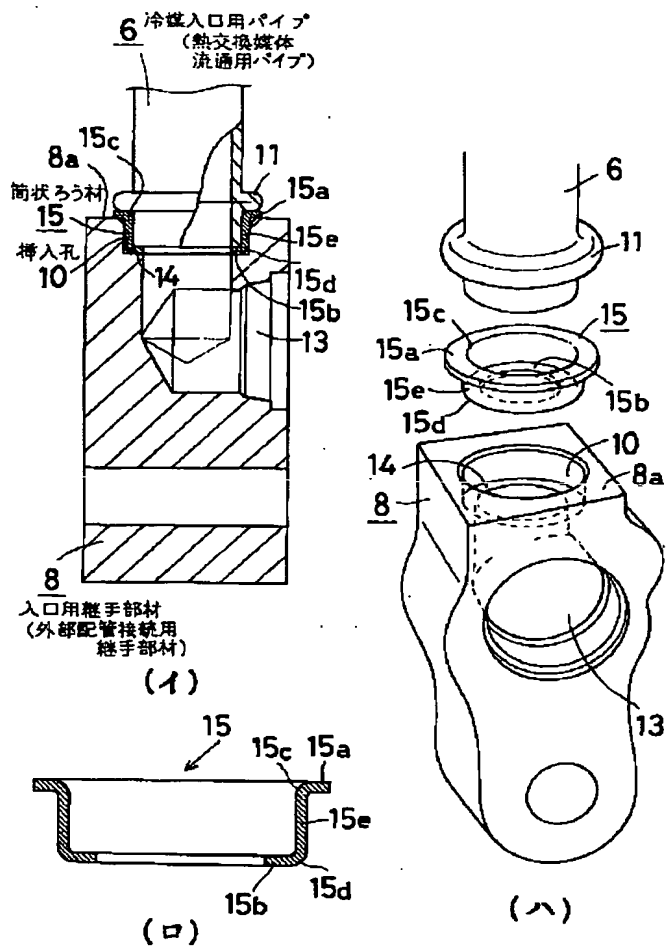
[Drawing 5]



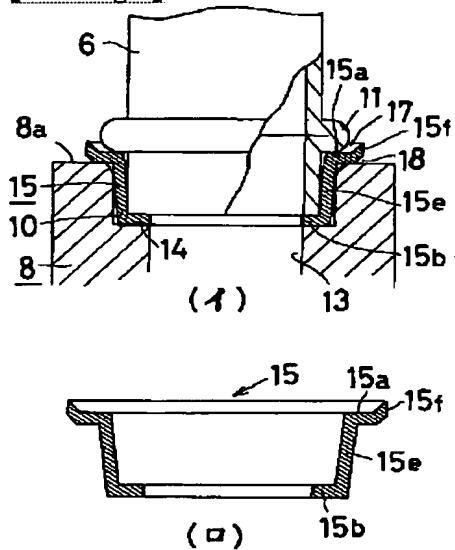
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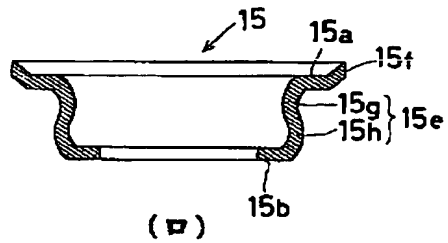
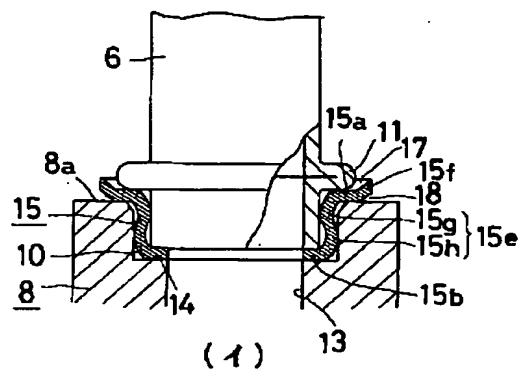
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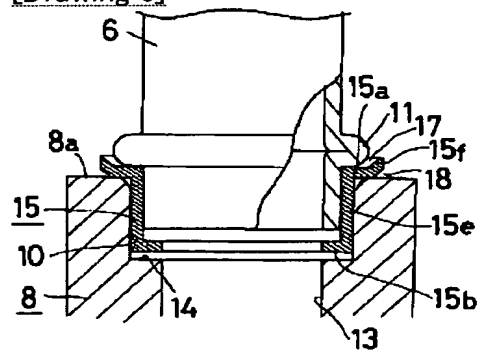
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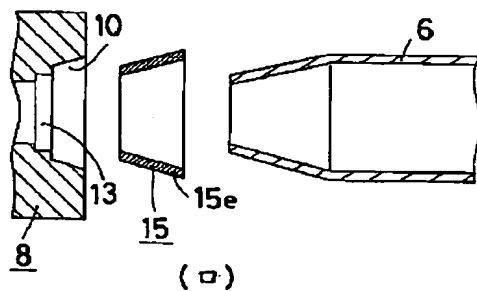
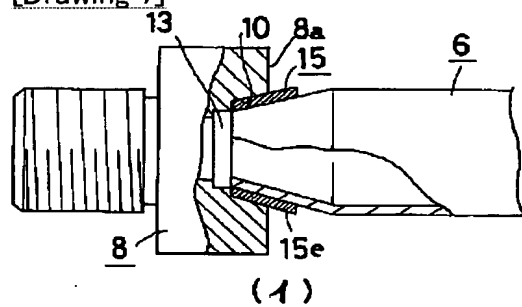
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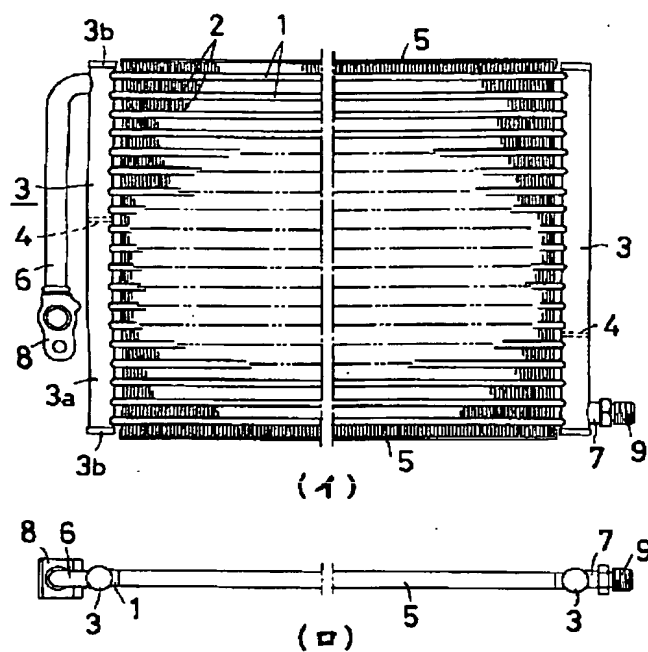
[Drawing 6]



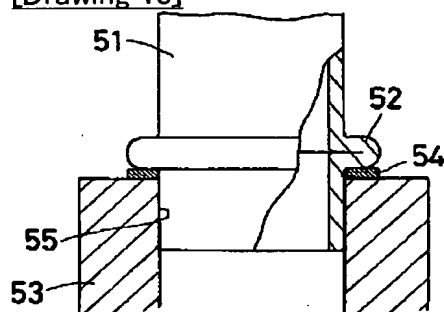
[Drawing 7]



[Drawing 9]



[Drawing 10]



[Translation done.]